HISTORICAL TRENDS IN MERCURY IN THE SAN FRANCISCO BAY−DELTA AND ITS WATERSHED: USING THE PAST TO INFORM FUTURE MANAGEMENT

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Public Comments

No public comments were received for this proposal.

Technical Synthesis Panel Review

Proposal Title

#0257: HISTORICAL TRENDS IN MERCURY IN THE SAN FRANCISCO BAY−DELTA AND ITS WATERSHED: USING THE PAST TO INFORM FUTURE MANAGEMENT

Final Panel Rating
inadequate

Technical Synthesis Panel (Primary) Review

TSP Primary Reviewer's Evaluation Summary And Rating:

The researchers propose to use museum specimens to compare historic Hg levels to present day levels in selected biota in the Bay−Delta region. They present a detailed discussion on how samples will be obtained from museums and various sources of specimens. They will attempt to understand the effects of gold mining of and other anthropogenic Hg activities on trends in bioaccumulation. It is hoped that specimens will be obtained that predate these influences so that a baseline level can be set for selected species. While the study could yield a worthwhile comparison of pre− and post− human−induced Hg shifts in the basin, the proposal lacks the detail to tease out various influences to ascribe sources of contamination. While Hg loading from river that drain watersheds that have been affected by gold mining activities, it is possible that local sources from other activities (industrial, power generation, incineration, etc.) could not be discerned from gold mining. Reviewers had concerns about the lack of details of various methodologies (“historical ecology research”, reliability of low sample mass to determine total and methyl Hg reliably). The lack of a sound process to choose a riparian specie and the reliance on an advisory committee to help choose other species for study give the impression that this study plan is not fully developed. Furthermore, PI’s need to

convince the reviewers that samples will be chosen that are free of contamination from outside sources (storage solutions, preservatives). All conspire to make this a very difficult study.

Additional Comments:

The researchers propose to use museum specimens to compare historic Hg levels to present day levels in selected biota in the Bay−Delta region. They present a detailed discussion on how samples will be obtained from museums and various sources of specimens. They will attempt to understand the effects of gold mining of and other anthropogenic Hg activities on trends in bioaccumulation. It is hoped that specimens will be obtained that predate these influences so that a baseline level can be set for selected species. While the study could yield a worthwhile comparison of pre− and post− human−induced Hg shifts in the basin, the proposal lacks the detail to tease out various influences to ascribe sources of contamination. While Hg loading from river that drain watersheds that have been affected by gold mining activities, it is possible that local sources from other activities (industrial, power generation, incineration, etc.) could not be discerned from gold mining. Reviewers had concerns about the lack of details of various methodologies (“historical ecology research”, reliability of low sample mass to determine total and methyl Hg reliably). The lack of a sound process to choose a riparian specie and the reliance on an advisory committee to help choose other species for study give the impression that this study plan is not fully developed. Furthermore, PI’s need to convince the reviewers that samples will be chosen that are free of contamination from outside sources (storage solutions, preservatives). All conspire to make this a very difficult study.

Technical Synthesis Panel (Discussion) Review

TSP Observations, Findings And Recommendations:

Historical Trends in Mercury in the San Francisco Bay–Delta and its Watershed: Using the Past to Inform Future Management

The strength of the proposal is that the results would be valuable, if reliable results could be obtained. The researchers failed to assure reviewers that adequate "clean" Hg techniques were applied and that potential sources of sample contamination would be evaluated.

A major weakness of the proposed work is that the proponents do not adequately explain how causal effects will be assigned to the changes in mercury levels in the specimens. This assignment of causes will be very difficult, given the mix of potential anthropogenic activities (gold mining, industrial inputs, atmospheric inputs).

Another problem identified by the panel was that sample sizes would be small. The panel felt that authors did not show sufficient explanation of what they would do with the results of the analyses. The authors did not identify all species that they would use and this was interpreted as insufficient development of the design of the proposed work. Though an advisory panel is a good check for progress and scientific review, too much reliance on them for study design was considered a weakness.

The panel concluded that the proponents have not done enough homework on previous published research that has used museum specimens and how they addressed problems with potential artificial contamination of specimens. The proposal did, in general, not provide enough details on methodological problems with mercury contamination in museum specimens to give the panel confidence of success.

Although the panel generally agreed with the primary reviewer, after panel discussion the initial assessment was lowered to inadequate.

Rating: inadequate

Technical Review #1

proposal title: HISTORICAL TRENDS IN MERCURY IN THE SAN FRANCISCO BAY−DELTA AND ITS WATERSHED: USING THE PAST TO INFORM FUTURE MANAGEMENT

Review Form

Goals

Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the idea timely and important?

Comments	**Yes. The goals, objectives and hypotheses were clearly stated and consistent. The idea of determining historic mercury levels in wildlife tissues will help to determine an appropriate benchmark for what will constitute uncontaminated populations.** **However, the majority of the proposal discusses how SFEI will address and accomplish analysis of museum and other available specimens. Very little time is spent on how SFEI will determine anthropogenic events, and mercury inputs to the Bay system or considering which riparian species would be appropriate.**
Rating	**good**

Justification

Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full−scale implementation project justified?

Comments	**Yes. The study is well justified and explains the underlying basis for the work.** **However, the stated hypothesis that trends of mercury over time will be correlated with sediment inputs or**

	atmospheric/urban runoff inputs is not well supported throughout the proposal. The proposal does a good job of describing methodology for specimen collection and analysisfor tidal species, but does a poor job of describing how SFEI will assess mercury inputs to the Bay system. There is no discussion of how SFEI will gather that information or of existing sources for that data. **Focusing only on three tidal marsh species did not seem well justified. No species are suggested for the Grinnell project.**
Rating	**good**

Approach

Is the approach well designed and appropriate for meeting the objectives of the project? Is the approach feasible? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology, or approaches? Will the information ultimately be useful to decision makers?

Comments	**The approach for collecting samples from museum specimens and analyzing for mercury content is well-planned and feasible. However, little planning was evident for how SFEI will sample and consider specimens from the Grinnell project** **The procedures for identifying the historic events and important sites was not well described. Being able to tie mercury concentrations to historic events will depend on knowing when and where important events occured and having museum specimens that bracket that period from that location. The likelhood of this occuring was not well-developed. Again, the sources for historic or local mercury inputs are not identified. The methods of how SFEI will gather the data to allow for correlation between mercury concentrations in wildlife and sources of mercury inputs is poorly stated.**

	Determining mercury concentrations in wildlife through time will be useful to decision makers. Without knowing how the researchers plan to identify and differentiate the anthropomorphic sources for mercury inputs it is not possible to know whether decision makers will be able make use of that information.
Rating	**good**

Feasibility

Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives and within the grasp of authors?

Comments	**The approach for for collecting and analyzing museum samples for mercury is adquately described. However the number of samples is not well−documented. SFEI's approach of waiting on a technical committees directives makes it difficult to determine whether SFEI will be able to have sufficient sample sizes to be successful. Since no methods are provided for how SFEI will assess mercury inputs, it is not possible to assess the feasiblity of this aspect or how SFEI will be able to correlate those findings with the concentrations in wildlife.** **The likelihood of success seems reasonable, but SFEI has not provided adequate information to fully assess it.**
Rating	**good**

Monitoring

If applicable, is monitoring appropriately designed (pre−post comparisons; treatment−control comparisons)? Are there plans to interpret monitoring data or otherwise develop information?

Comments	**SFEI discusses implications for future monitoring but no monitoring plan in the current study design.**
Rating	

	not applicable

Products

Are products of value likely from the project? Are contributions to larger data management systems relevant and considered? Are interpretive (or interpretable) outcomes likely from the project?

Comments	**The effort to determine historic mercury concentrations in wildlife is worthwhile and will assist in directing how goals for appropriate concentrations in wildlife for the future are determined. Too little consideration is given to how urban runoff or other anthropormphic inputs will be assessed to allow an evaluation of whether useful products will be available from that portion of the study.**
Rating	**good**

Additional Comments

Comments	**Any of the collaborators, including analytical labs should investigate whether they will need Federal permits to possess feathers or fur of listed species.** **I am not sure SFEI has provided adequate justification for the ability to correlate mercury concentrations with mercury inputs into the Bay system or for how they will consider riparian species. It might be appropriate to fund the tidal marsh work focusing on the museum specimens without the riparian work as a pilot effort and consider the riparian issues and correlations with anthropomorphic inputs at a future date when SFEI can better describe methodology for those approaches.**

Capabilities

What is the track record of authors in terms of past performance? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

Comments	**I have no specific knowledge of the track record of SFEI; therefore, I cannot make any comment regarding that issue. However, SFEI appears qualified from reputation and a review of CV's and website.**
Rating	**good**

Budget

Is the budget reasonable and adequate for the work proposed?

Comments	**SFEI has requested $72,183 for pre-Gold Rush and historical ecology research, but provided no methodology for that aspect of the research. Therefore, it is not possible to assess whether that budget is reasonable or adequate.** **Since the sample size is not determined the reasonableness or adequacy of the analytical budget cannot be assessed.** **It seems there is insufficient detail in the proposal to justify a three year $734K project.**
Rating	**fair**

Overall

Provide a brief explanation of your summary rating.

Comments	**The approach of establishing a technical advisory committee can be helpful, especially when there is a concrete proposal to critique and improve. However, the approach here is to depend heavily on the input**

	from the committee. That makes assessing the likely success of this proposal difficult. **I like the overall idea of developing a historic record of mercury concentrations in wildlife. SFEI did a very nice job of establishing the concepts behind the research and was good at describing the museum collections and analytical procedures for the marsh species, but was incomplete on the selection of riparian species. The overall detail regarding field collections to be performed by PRBO, the number of specimens anticipated, etc was incomplete.** **The statistical methods and sample sizes were not stated at all.**
Rating	**good**

Technical Review #2

proposal title: HISTORICAL TRENDS IN MERCURY IN THE SAN FRANCISCO BAY−DELTA AND ITS WATERSHED: USING THE PAST TO INFORM FUTURE MANAGEMENT

Review Form

Goals

Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the idea timely and important?

Comments	**The goals and objectives are clearly stated, and the work is timely. This project would provide long−term trend information from selected marsh and riparian sites that could enhance the interpretation of data from other efforts (recent, ongoing, and planned) to survey or monitor mercury in biota of the Bay−Delta ecosystem.**
Rating	**very good**

Justification

Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full−scale implementation project justified?

Comments	**The study is justified, given that a there is very little information available to assess long−term trends in methylmercury contamination and biotic exposure in this ecosystem. This project would provide long−term trend information that would be useful for assessing the effect of specific historic mercury sources and human activities on methylmercury exposure of resident biota in selected areas of the Bay−Delta ecosystem. It is widely assumed that historic mining activities provide most (or much) of the mercury**

	accumulating as methylmercury in biota in this ecosystem. However, some data suggest that industrial sources and atmospheric deposition may be potentially significant sources of mercury in parts of the ecosystem.
Rating	**very good**

Approach

Is the approach well designed and appropriate for meeting the objectives of the project? Is the approach feasible? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology, or approaches? Will the information ultimately be useful to decision makers?

Comments	**The approach appears to be feasible, given the variety of species and numbers of specimens available in museum collections. The proponents plan to measure total mercury in all museum specimens and to measure methylmercury only in a small subset of the samples. This reviewer is not convinced, however, that it can be safely assumed that determination of total mercury will provide defensible estimates of (bioaccumulated) methylmercury in museum specimens. Any contaminant mercury on museum specimens from processing and long-term storage would be expected to be inorganic mercury, rather than methylmercury. I recommend that paired analysis of samples for both total mercury and methylmercury initially be done to evaluate the use of total mercury determinations to estimate methylmercury concentrations; this should be done before large numbers of samples are analyzed only for total mercury.**
Rating	**good**

Feasibility

Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives and within the grasp of authors?

Comments	**The approach appears to be technically feasible, and there is a reasonably good likelihood of success. The proposal would be greatly strengthened by including a much more comprehensive description of criteria used to select an analytical laboratory to perform the mercury analyses, given that the success of the project hinges strongly on the capability of the contractor selected to produce reliable measurements of total and methyl mercury. For example, the proposal should have specified--given the very small mass of samples to be analyzed--that the contract laboratory have proven capabilities with (1) atomic fluorescence for total mercury and methylmercury determinations and (2) with the use of clean techniques for handling of samples. In addition, there should be a description of quality assurance procedures for estimating the accuracy and precision of analytical measurements by the contractor. Inter-laboratory comparisons, by themselves, are not sufficient.**
Rating	**fair**

Monitoring

If applicable, is monitoring appropriately designed (pre−post comparisons; treatment−control comparisons)? Are there plans to interpret monitoring data or otherwise develop information?

Comments	**This project would provide historical information that would enhance the interpretation of data from recent, ongoing, and future monitoring efforts and surveys of mercury in biota of the Bay-Delta ecosystem.**
Rating	**very good**

Products

Are products of value likely from the project? Are contributions to larger data management systems relevant and considered? Are interpretive (or interpretable) outcomes likely from the project?

Comments	**Products of value would include semi-annual progress reports, a final report, raw data, presentations at scientific meetings, papers published in lay journals, and papers published in refereed scientific journals. Public access to project data and reports would be provided via the SFEI Web site. Data would not be posted until final publication of project results, which could delay their availability to the public by a few years.**
Rating	**very good**

Additional Comments

Comments

Capabilities

What is the track record of authors in terms of past performance? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

Comments	**The Lead Scientist on the project (JLG) has little experience in leading projects of this magnitude and complexity and has a limited publication record. The largest prior grant awarded to this investigator, for example, was for $15,000 in 2001. The project team at SFEI does contain personnel (Davis and Collins) whose active involvement and guidance would bring seasoned experience with large, complex projects, as well as experience in the analysis, interpretation, and publication of complex data sets.**
Rating	**good**

Budget

Is the budget reasonable and adequate for the work proposed?

Comments	**The budget appears to be reasonable. The analytical (contractual) costs of the project would increase**

	significantly if analysis of methylmercury, rather than total mercury, in all museum specimens were necessary.
Rating	**very good**

Overall

Provide a brief explanation of your summary rating.

Comments	**This proposed project was given a summary rating of "good," largely because of concerns regarding potential problems with analytical reliability (addressed above under "Feasibility"). Otherwise, this reviewer would have given this proposal a rating of "very good."**
Rating	**good**